5 What is claimed is:

- 1. A method for treating, preventing and/or managing an asbestos-related disease or disorder in a patient, comprising administering to a patient in need thereof an effective amount of a JNK Inhibitor or a pharmaceutically acceptable salt thereof.
- A method for treating, preventing and/or managing an asbestos-related disease or
 disorder in a patient, comprising administering to a patient in need thereof an effective amount of a compound having the following formula:

or a pharmaceutically acceptable salt thereof,

15 wherein:

A is a direct bond, $-(CH_2)_{a^-}$, $-(CH_2)_bCH=CH(CH_2)_{c^-}$, or $-(CH_2)_bC\equiv C(CH_2)_{c^-}$;

R₁ is aryl, heteroaryl or heterocycle fused to phenyl, each being optionally substituted with one to four substituents independently selected from R₃;

 $R_2 \text{ is } -R_3, -R_4, -(CH_2)_bC(=O)R_5, -(CH_2)_bC(=O)OR_5, -(CH_2)_bC(=O)NR_5R_6,$ $20 -(CH_2)_bC(=O)NR_5(CH_2)_cC(=O)R_6, -(CH_2)_bNR_5C(=O)R_6, -(CH_2)_bNR_5C(=O)NR_6R_7,$ $-(CH_2)_bNR_5R_6, -(CH_2)_bOR_5, -(CH_2)_bSO_dR_5 \text{ or } -(CH_2)_bSO_2NR_5R_6;$

a is 1, 2, 3, 4, 5 or 6;

b and c are the same or different and at each occurrence independently selected from 0, 1, 2, 3 or 4;

25 d is at each occurrence 0, 1 or 2;

R₃ is at each occurrence independently halogen, hydroxy, carboxy, alkyl, alkoxy, haloalkyl, acyloxy, thioalkyl, sulfinylalkyl, sulfonylalkyl, hydroxyalkyl, aryl, substituted aryl, arylalkyl, heterocycle, heterocycloalkyl, -C(=O)OR₈, -OC(=O)R₈, -C(=O)NR₈R₉, -C(=O)NR₈OR₉, -SO₂NR₈R₉, -NR₈SO₂R₉, -CN, -NO₂, -NR₈R₉, -NR₈C(=O)R₉, -NR₈C(=O)(CH₂)_bNR₉, -O(CH₂)_bNR₈R₉, or heterocycle fused to phenyl;

 R_4 is alkyl, aryl, arylalkyl, heterocycle or heterocycloalkyl, each being optionally substituted with one to four substituents independently selected from R_3 , or R_4 is halogen or hydroxy;

R₅, R₆ and R₇ are the same or different and at each occurrence independently hydrogen, alkyl, arylalkyl, heterocycle or heterocycloalkyl, wherein each of R₅, R₆ and R₇ are optionally substituted with one to four substituents independently selected from R₃; and R₈ and R₉ are the same or different and at each occurrence independently hydrogen, alkyl, aryl, arylalkyl, heterocycle, or heterocycloalkyl, or R₈ and R₉ taken together with the atom or atoms to which they are bonded form a heterocycle, wherein each of R₈, R₉, and R₈ and R₉ taken together to form a heterocycle are optionally substituted with one to four substituents independently selected from R₃.

3. A method for treating, preventing and/or managing an asbestos-related disease or disorder in a patient, comprising administering to a patient in need thereof an effective amount of a compound having the following formula:

$$R_2$$
 R_1
 R_3
 R_4
 R_5
 R_6

or a pharmaceutically acceptable salt thereof,

30 wherein:

15

20

25

R₁ is aryl or heteroaryl optionally substituted with one to four substituents independently selected from R₇;

R₂ is hydrogen;

15

R₃ is hydrogen or lower alkyl;

R₄ represents one to four optional substituents, wherein each substituent is the same or different and independently selected from halogen, hydroxy, lower alkyl and lower alkoxy;

 R_5 and R_6 are the same or different and independently $-R_8$, $-(CH_2)_aC(=O)R_9$, $-(CH_2)_aC(=O)NR_9R_{10}$, $-(CH_2)_aC(=O)NR_9(CH_2)_bC(=O)R_{10}$, $-(CH_2)_aNR_9C(=O)R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aSO_2NR_9R_{10}$;

or R₅ and R₆ taken together with the nitrogen atom to which they are attached to form a heterocycle or substituted heterocycle;

R₇ is at each occurrence independently halogen, hydroxy, cyano, nitro, carboxy, alkyl, alkoxy, haloalkyl, acyloxy, thioalkyl, sulfinylalkyl, sulfonylalkyl, hydroxyalkyl, aryl, arylalkyl, heterocycle, heterocycloalkyl, -C(=O)OR₈, -OC(=O)R₈, -C(=O)NR₈R₉, -C(=O)NR₈R₉, -C(=O)NR₈R₉, -NR₈C(=O)R₉, -NR₈C(=O)R₉, -NR₈C(=O)R₉, -NR₈C(=O)R₉, -NR₈C(=O)R₉, -NR₈C(=O)R₉, -NR₈C(=O)R₉, -NR₈C(=O)R₉, -O(CH₂)_bNR₈R₉, or heterocycle fused to phenyl;

R₈, R₉, R₁₀ and R₁₁ are the same or different and at each occurrence independently hydrogen, alkyl, substituted alkyl, aryl, arylalkyl, heterocycle or heterocycloalkyl.;

or R₈ and R₉ taken together with the atom or atoms to which they are attached to form a heterocycle;

a and b are the same or different and at each occurrence independently selected from 0, 1, 2, 3 or 4; and

WO 2005/046594

- 5 c is at each occurrence 0, 1 or 2.
 - 4. A method for treating, preventing and/or managing an asbestos-related disease or disorder in a patient, comprising administering to a patient in need thereof an effective amount of a compound having the following formula:

10

20

$$\begin{array}{c|c}
1 & 2 \\
N & R_0 \\
8 & 7 & 6 & 5
\end{array}$$

or a pharmaceutically acceptable salt thereof,

wherein R_0 is -O-, -S-, -S(O)-, -S(O)₂-, NH or -CH₂-;

the compound being (i) unsubstituted, (ii) monosubstituted and having a first substituent, or (iii) disubstituted and having a first substituent and a second substituent;

the first or second substituent, when present, is at the 3, 4, 5, 7, 8, 9, or 10 position, wherein the first and second substituent, when present, are independently alkyl, hydroxy, halogen, nitro, trifluoromethyl, sulfonyl, carboxyl, alkoxycarbonyl, alkoxy, aryl, aryloxy, arylalkyloxy, arylalkyl, cycloalkylalkyloxy, cycloalkyloxy, alkoxyalkyl, alkoxyalkoxy, aminoalkoxy, mono-alkylaminoalkoxy, di-alkylaminoalkoxy, or a group represented by formula (a), (b), (c), (d), (e), or (f):

wherein R₃ and R₄ are taken together and represent alkylidene or a heteroatom-containing cyclic alkylidene or R₃ and R₄ are independently hydrogen, alkyl, cycloalkyl, aryl, arylalkyl, cycloalkylalkyl, aryloxyalkyl, alkoxyalkyl, aminoalkyl, monoalkylaminoalkyl, or di-alkylaminoalkyl; and

R₅ is hydrogen, alkyl, cycloalkyl, aryl, arylalkyl, cycloalkylalkyl, alkoxy, alkoxyalkyl, alkoxycarbonylalkyl, amino, mono-alkylamino, di-alkylamino, arylamino, arylalkylamino, cycloalkylamino, cycloalkylamino, aminoalkyl, mono-alkylaminoalkyl, or di-alkylaminoalkyl.

- 5. The method of claim 2 wherein A is a direct bond.
- 6. The method of claim 2 wherein A is $-(CH_2)_{a}$.
- 15 7. The method of claim 2 wherein A is $-(CH_2)_bCH=CH(CH_2)_c$.
 - 8. The method of claim 2 wherein A is $-(CH_2)_bC \equiv C(CH_2)_c$.
 - 9. The method of claim 2 wherein the compound has the following formula:

5

20

25

or a pharmaceutically acceptable salt thereof,

wherein:

A is a direct bond, $-(CH_2)_a$, $-(CH_2)_bCH=CH(CH_2)_c$, or $-(CH_2)_bC\equiv C(CH_2)_c$;

R₁ is aryl, heteroaryl or heterocycle fused to phenyl, each being optionally substituted with one to four substituents independently selected from R₃;

$$\begin{split} R_2 \ \ &\text{is -R}_3, \ \text{-R}_4, \ \text{-}(\text{CH}_2)_b C (=&\text{O}) R_5, \ \text{-}(\text{CH}_2)_b C (=&\text{O}) \text{NR}_5 R_6, \ \text{-}\\ &(\text{CH}_2)_b C (=&\text{O}) \text{NR}_5 (\text{CH}_2)_c C (=&\text{O}) R_6, \ \text{-}(\text{CH}_2)_b \text{NR}_5 C (=&\text{O}) R_6, \ \text{-}(\text{CH}_2)_b \text{NR}_5 C (=&\text{O}) \text{NR}_6 R_7, \ \text{-}\\ &(\text{CH}_2)_b \text{NR}_5 R_6, \ \text{-}(\text{CH}_2)_b \text{OR}_5, \ \text{-}(\text{CH}_2)_b \text{SO}_4 R_5 \ \text{or -}(\text{CH}_2)_b \text{SO}_2 \text{NR}_5 R_6; \ \end{split}$$

a is 1, 2, 3, 4, 5 or 6;

b and c are the same or different and at each occurrence independently selected from 0,
 1, 2, 3 or 4;

d is at each occurrence 0, 1 or 2;

 R_3 is at each occurrence independently halogen, hydroxy, carboxy, alkyl, alkoxy, haloalkyl, acyloxy, thioalkyl, sulfinylalkyl, sulfonylalkyl, hydroxyalkyl, aryl, arylalkyl, heterocycle, heterocycloalkyl, $-C(=O)OR_8$, $-OC(=O)R_8$, $-C(=O)NR_8R_9$, $-C(=O)NR_8OR_9$, $-SO_2NR_8R_9$, $-NR_8SO_2R_9$, -CN, $-NO_2$, $-NR_8R_9$, $-NR_8C(=O)R_9$, $-NR_8C(=O)(CH_2)_bOR_9$, $-NR_8C(=O)(CH_2)_bNR_9$, or heterocycle fused to phenyl;

 R_4 is alkyl, aryl, arylalkyl, heterocycle or heterocycloalkyl, each being optionally substituted with one to four substituents independently selected from R_3 , or R_4 is halogen or hydroxy;

R₅, R₆ and R₇ are the same or different and at each occurrence independently hydrogen, alkyl, aryl, arylalkyl, heterocycle or heterocycloalkyl, wherein each of R₅, R₆ and R₇ are optionally substituted with one to four substituents independently selected from R₃; and

R₈ and R₉ are the same or different and at each occurrence independently hydrogen, alkyl, aryl, arylalkyl, heterocycle, or heterocycloalkyl, or R₈ and R₉ taken together with the atom or atoms to which they are bonded form a heterocycle, wherein each of R₈, R₉, and R₉ taken together to form a heterocycle are optionally substituted with one to four substituents independently selected from R₃.

10. The method of claim 2 wherein the compound has the following formula:

15

25

10

or a pharmaceutically acceptable salt thereof,

wherein:

A is a direct bond, $-(CH_2)_a$, $-(CH_2)_bCH=CH(CH_2)_c$, or $-(CH_2)_bC\equiv C(CH_2)_c$;

 R_1 is aryl, heteroaryl or heterocycle fused to phenyl, each being optionally substituted with one to four substituents independently selected from R_3 ;

R₂ is -R₃, -R₄, -(CH₂)_bC(=O)R₅, -(CH₂)_bC(=O)OR₅, -(CH₂)_bC(=O)NR₅R₆, - (CH₂)_bC(=O)NR₅(CH₂)_cC(=O)R₆, -(CH₂)_bNR₅C(=O)R₆, -(CH₂)_bNR₅C(=O)NR₆R₇, - (CH₂)_bNR₅R₆, -(CH₂)_bOR₅, -(CH₂)_bSO₂NR₅R₆.

a is 1, 2, 3, 4, 5 or 6;

b and c are the same or different and at each occurrence independently selected from 0, 1, 2, 3 or 4;

5 d is at each occurrence 0, 1 or 2;

10

20

 R_3 is at each occurrence independently halogen, hydroxy, carboxy, alkyl, alkoxy, haloalkyl, acyloxy, thioalkyl, sulfinylalkyl, sulfonylalkyl, hydroxyalkyl, aryl, arylalkyl, heterocycle, heterocycloalkyl, $-C(=O)OR_8$, $-OC(=O)R_8$, $-C(=O)NR_8R_9$, $-C(=O)NR_8OR_9$, $-SO_2NR_8R_9$, $-NR_8SO_2R_9$, -CN, $-NO_2$, $-NR_8C(=O)R_9$, $-NR_8C(=O)(CH_2)_bOR_9$, $-NR_8C(=O)(CH_2)_bNR_9$, or heterocycle fused to phenyl;

 R_4 is alkyl, aryl, arylalkyl, heterocycle or heterocycloalkyl, each being optionally substituted with one to four substituents independently selected from R_3 , or R_4 is halogen or hydroxy;

R₅, R₆ and R₇ are the same or different and at each occurrence independently hydrogen, alkyl, aryl, arylalkyl, heterocycle or heterocycloalkyl, wherein each of R₅, R₆ and R₇ are optionally substituted with one to four substituents independently selected from R₃; and

 R_8 and R_9 are the same or different and at each occurrence independently hydrogen, alkyl, aryl, arylalkyl, heterocycle, or heterocycloalkyl, or R_8 and R_9 taken together with the atom or atoms to which they are bonded form a heterocycle, wherein each of R_8 , R_9 , and R_8 and R_9 taken together to form a heterocycle are optionally substituted with one to four substituents independently selected from R_3 .

11. The method of claim 2 wherein the compound has the following formula:

or a pharmaceutically acceptable salt thereof.

5 12. The method of claim 3, wherein the compound has the following formula:

or a pharmaceutically acceptable salt thereof,

wherein:

10 R_1 is aryl or heteroaryl optionally substituted with one to four substituents independently selected from R_7 ;

R₂ is hydrogen;

20

25

R₃ is hydrogen or lower alkyl;

R₄ represents one to four optional substituents, wherein each substituent is the same or different and independently selected from halogen, hydroxy, lower alkyl and lower alkoxy;

 R_5 and R_6 are the same or different and independently $-R_8$, $-(CH_2)_aC(=O)R_9$, $-(CH_2)_aC(=O)NR_9R_{10}$, $-(CH_2)_aC(=O)NR_9(CH_2)_bC(=O)R_{10}$, $-(CH_2)_aNR_9C(=O)R_{10}$, $(CH_2)_aNR_{11}C(=O)NR_9R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aSO_2NR_9R_{10}$;

or R₅ and R₆ taken together with the nitrogen atom to which they are attached to form a heterocycle or substituted heterocycle;

R₇ is at each occurrence independently halogen, hydroxy, cyano, nitro, carboxy, alkyl, alkoxy, haloalkyl, acyloxy, thioalkyl, sulfinylalkyl, sulfonylalkyl, hydroxyalkyl, aryl, arylalkyl, heterocycle, heterocycloalkyl, -C(=O)OR₈, -OC(=O)R₈, -C(=O)NR₈R₉, -C(=O)NR₈R₉, -C(=O)NR₈C₈, -SO₆NR₈R₉, -NR₈SO₆R₉, -NR₈C₈, -NR₈C₈,

5 NR₈C(=O)(CH₂)_bOR₉, -NR₈C(=O)(CH₂)_bR₉, -O(CH₂)_bNR₈R₉, or heterocycle fused to phenyl;

 R_8 , R_9 , R_{10} and R_{11} are the same or different and at each occurrence independently hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, arylalkyl, heterocycle, heterocycloalkyl;

or R₈ and R₉ taken together with the atom or atoms to which they are attached to form a heterocycle;

a and b are the same or different and at each occurrence independently selected from 0, 1, 2, 3 or 4; and

c is at each occurrence 0, 1 or 2.

15

13. The method of claim 3, wherein the compound has the following formula:

20 or a pharmaceutically acceptable salt thereof,

wherein:

 R_1 is aryl or heteroaryl optionally substituted with one to four substituents independently selected from R_7 ;

R₂ is hydrogen;

25 R₃ is hydrogen or lower alkyl;

R₄ represents one to four optional substituents, wherein each substituent is the same or different and independently selected from halogen, hydroxy, lower alkyl and lower alkoxy;

5 R₅ and R₆ are the same or different and independently -R₈, -(CH₂)_aC(=O)R₉, - (CH₂)_aC(=O)OR₉, -(CH₂)_aC(=O)NR₉R₁₀, -(CH₂)_aC(=O)NR₉(CH₂)_bC(=O)R₁₀, - (CH₂)_aNR₉C(=O)R₁₀, (CH₂)_aNR₁C(=O)NR₉R₁₀, -(CH₂)_aNR₉R₁₀, -(CH₂)_aOR₉, - (CH₂)_aSO₂R₉ or -(CH₂)_aSO₂NR₉R₁₀;

or R₅ and R₆ taken together with the nitrogen atom to which they are attached to form a heterocycle or substituted heterocycle;

R₇ is at each occurrence independently halogen, hydroxy, cyano, nitro, carboxy, alkyl, alkoxy, haloalkyl, acyloxy, thioalkyl, sulfinylalkyl, sulfonylalkyl, hydroxyalkyl, aryl, arylalkyl, heterocycle, heterocycloalkyl, -C(=O)OR₈, -OC(=O)R₈, -C(=O)NR₈R₉, -C(=O)NR₈OR₉, -SO_cR₈, -SO_cNR₈R₉, -NR₈SO_cR₉, -NR₈R₉, -NR₈C(=O)R₉, -

NR₈C(=O)(CH₂)_bOR₉, -NR₈C(=O)(CH₂)_bR₉, -O(CH₂)_bNR₈R₉, or heterocycle fused to phenyl;

R₈, R₉, R₁₀ and R₁₁ are the same or different and at each occurrence independently hydrogen, alkyl, aryl, arylalkyl, heterocycle, heterocycloalkyl;

or R_8 and R_9 taken together with the atom or atoms to which they are attached to form a 20 heterocycle;

a and b are the same or different and at each occurrence independently selected from 0, 1, 2, 3 or 4; and

c is at each occurrence 0, 1 or 2.

10

25 14. The method of claim 3, wherein the compound has the following formula:

$$R_7$$
 N
 N
 N
 N
 R_6

or a pharmaceutically acceptable salt thereof,

5 wherein:

 R_1 is aryl or heteroaryl optionally substituted with one to four substituents independently selected from R_7 ;

R₂ is hydrogen;

R₃ is hydrogen or lower alkyl;

10 R₄ represents one to four optional substituents, wherein each substituent is the same or different and independently selected from halogen, hydroxy, lower alkyl and lower alkoxy;

 R_5 and R_6 are the same or different and independently $-R_8$, $-(CH_2)_aC(=O)R_9$, $-(CH_2)_aC(=O)NR_9R_{10}$, $-(CH_2)_aC(=O)NR_9(CH_2)_bC(=O)R_{10}$, $-(CH_2)_aNR_9C(=O)R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aNR_9R_{10}$, $-(CH_2)_aSO_cR_9$ or $-(CH_2)_aSO_2NR_9R_{10}$;

or R₅ and R₆ taken together with the nitrogen atom to which they are attached to form a heterocycle;

R₇ is at each occurrence independently halogen, hydroxy, cyano, nitro, carboxy, alkyl, alkoxy, haloalkyl, acyloxy, thioalkyl, sulfinylalkyl, sulfonylalkyl, hydroxyalkyl, aryl, arylalkyl, heterocycle, heterocycloalkyl, -C(=O)OR₈, -OC(=O)R₈, -C(=O)NR₈R₉, -C(=O)NR₈OR₉, -SO_cR₈, -SO_cNR₈R₉, -NR₈SO_cR₉, -NR₈R₉, -NR₈C(=O)R₉, -NR₈C(=O)(CH₂)_bOR₉, -NR₈C(=O)(CH₂)_bNR₈R₉, or heterocycle fused to phenyl;

R₈, R₉, R₁₀ and R₁₁ are the same or different and at each occurrence independently hydrogen, alkyl, substituted alkyl, aryl, arylalkyl, heterocycle, heterocycloalkyl;

or R₈ and R₉ taken together with the atom or atoms to which they are attached to form a heterocycle;

10

20

25

a and b are the same or different and at each occurrence independently selected from 0, 1, 2, 3 or 4; and

c is at each occurrence 0, 1 or 2.

- 15. The method of claim 4, wherein R_0 is -O-.
- 16. The method of claim 4, wherein R_0 is -S-.
- 17. The method of claim 4, wherein R_0 is-S(O)-.
- 15 18. The method of claim 4, wherein R_0 is $-S(O)_2$.
 - 19. The method of claim 4, wherein R_0 is NH.
- 20. The method of claim 4, wherein R_0 is CH_2 -.
 - 21. The method of claim 4, wherein the compound has the following formula:

or a pharmaceutically acceptable salt thereof.

- 22. The method of claim 1, further comprising administering a second active agent.
- 23. The method of claim 2, further comprising administering a second active agent.
- 24. The method of claim 3, further comprising administering a second active agent.

PCT/US2004/037084 WO 2005/046594

The method of claim 4, further comprising administering a second active agent. 5 25.

- The method of claim 22, wherein the second active agent is an anti-cancer agent, 26. antibiotic, anti-inflammatory agent, steroid, immunomodulatory agent, cytokine, immunosuppressive agent, an IMiD®, a SelCID® or a combination thereof.
- 27. The method of claim 23, wherein the second active agent is anthracycline, platinum, alkylating agent, interferon, oblimersen, cisplatinum, cyclophosphamide, 10 irinotecan, topotecan, temozolomide, temodar, carboplatin, procarbazine, gliadel, tamoxifen, methotrexate, taxotere, capecitabine, cisplatin, thiotepa, fludarabine, liposomal daunorubicin, cytarabine, doxetaxol, pacilitaxel, vinblastine, GM-CSF, IL-2, dacarbazine, vinorelbine, zoledronic acid, palmitronate, biaxin, busulphan, prednisone, bisphosphonate, arsenic trioxide, vincristine, doxorubicin, paclitaxel, ganciclovir, 15 adriamycin, bleomycin, hyaluronidase, mitomycin C, mepacrine, thiotepa, tetracycline, thalidomide or gemcitabine.
 - 28. The method of claim 1, wherein the disease or disorder is mesothelioma, asbestosis, pleural effusion, pleural plaque, pleural calcification, diffuse pleural thickening, round atelectasis, or bronchogenic carcinoma.
 - A method of treating, preventing or managing an asbestos-related disease or 29. disorder, which comprises administering to a patient in need of such treatment, prevention or management an effective amount of a JNK Inhibitor, or a pharmaceutically acceptable salt thereof, before, during or after chemotherapy, photodynamic therapy,
- 25 surgery, radiation therapy, gene therapy, or immunotherapy.

20

This Page is Inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

☐ BLACK BORDERS
☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
☐ FADED TEXT OR DRAWING
☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
☐ SKEWED/SLANTED IMAGES
☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
☐ GRAY SCALE DOCUMENTS
☐ LINES OR MARKS ON ORIGINAL DOCUMENT

IMAGES ARE BEST AVAILABLE COPY.

□ OTHER: _____

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY